

SYSMAC CS-series Programmable Controllers

Safety Precautions

OMRON

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Thank you for purchasing an OMRON Programmable Controller (PLC). To ensure safe operation, please be sure to read the safety precautions provided in this document along with all of the user manuals for the Programmable Controller. Please be sure you are using the most recent versions of the user manuals. Contact your nearest OMRON representative to obtain manuals. Keep these safety precautions and all user manuals in a safe location and be sure that they are readily available to the final user of the products.

■ General Precautions


The user must operate the product according to the performance specifications described in the operation manuals.


Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, petrochemical plants, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.


Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

■ Safety Precautions


Definition of Precautionary Information


 **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.


 **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.


 **Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Warnings and Cautions


 **WARNING** Do not attempt to take any Unit apart while the power is being supplied. Doing so may result in electric shock.


 **WARNING** Do not touch any of the terminals or terminal blocks while the power is being supplied. Doing so may result in electric shock.


 **WARNING** Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in malfunction, fire, or electric shock.


 **WARNING** Provide safety measures in external circuits, i.e., not in the Programmable Controller (CPU Unit including associated Units; referred to as "PLC"), in order to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents.


- Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.
- The PLC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. As a countermeasure for such errors, external safety measures must be provided to ensure safety in the system.
- The PLC outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.
- When the 24-VDC output (service power supply to the PLC) is overloaded or short-circuited, the voltage may drop and result in the outputs being turned OFF. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.


 **WARNING** Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes. Not doing so may result in serious accidents.


 **Caution** Pay careful attention to the polarities (+/-) when wiring the DC power supply. A wrong connection may cause malfunction of the system.


 **Caution** Execute online edit only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable.


 **Caution** Confirm safety at the destination node before transferring a program to another node or editing the I/O area. Doing either of these without confirming safety may result in injury.

 **Caution** Tighten the screws on the terminal block of the AC Power Supply Unit to the torque specified in the operation manual. The loose screws may result in burning or malfunction.


 **Caution** Do not touch the Power Supply Unit during power-on, and immediately after power-off. Hot surface may cause heat injury.

 **Caution** After programming (or re-programming) using the IOWR instruction, confirm that correct operation is possible with the new ladder program and data before starting actual operation. Any irregularities may cause the product to stop operating, resulting in unexpected operation in machinery or equipment.


 **Caution** When the battery power is low or when no battery is inserted with the CS1G/H/D-CPU□□□H/S Units, the contents of the user memory are saved in non-volatile memory. (Operation is not stopped due to a memory error.) Accordingly, the PLC System can be operated even when the battery power is low or no battery is inserted, but the DM and EM areas become unstable in this condition. When the contents of the DM and EM areas are output with a program, use the Battery Error Flag to stop output.

 **Caution** Caution is required when connecting peripheral devices, such as a personal computer, to the PLC when Units with non-isolated power supplies, such as the CS1W-CLK12/CLK52 (-V1), that are connected to an external power supply are mounted to the PLC. If the 24-V side is grounded on the external power supply, a short will be created if the 0-V side of the peripheral device is grounded. When connecting peripheral devices, either ground the 0-V side of the external power supply or do not ground the external power supply at all.


■ Operating Environment Precautions

 **Caution** Do not operate the control system in the following places:


- Locations subject to direct sunlight
- Locations subject to temperatures or humidity outside the range specified in the specifications
- Locations subject to condensation as the result of severe changes in temperature
- Locations subject to corrosive or flammable gases
- Locations subject to dust (especially iron dust) or salts
- Locations subject to exposure to water, oil, or chemicals
- Locations subject to shock or vibration

 **Caution** Take appropriate and sufficient countermeasures when installing systems in the following locations:


- Locations subject to static electricity or other forms of noise
- Locations subject to strong electromagnetic fields
- Locations subject to possible exposure to radioactivity
- Locations close to power supplies

 **Caution** The operating environment of the PLC System can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the PLC System. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

■ Application Precautions

 **WARNING** Always heed these precautions. Failure to abide by the following precautions could lead to serious or possibly fatal injury.

- Always connect to 100 Ω or less when installing the Units. Not connecting to a ground of 100 Ω or less may result in electric shock.
- Always turn OFF the power supply to the PLC before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock.
 - Mounting or dismounting Power Supply Units, I/O Units, CPU Units, or any other Units
 - Assembling the Units
 - Setting DIP switches or rotary switches
 - Connecting or wiring the cables
 - Connecting or disconnecting the connectors

 **Caution** Failure to abide by the following precautions could lead to faulty operation of the PLC or the system, or could damage the PLC or PLC Units. Always heed these precautions.

- Always use the power supply voltage specified in the operation manuals. An incorrect voltage may result in malfunction or burning.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction.
- Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures against short-circuiting may result in burning.
- Do not apply voltages to the Input Units in excess of the rated input voltage. Excess voltages may result in burning.
- Do not apply voltages or connect loads to the Output Units in excess of the maximum switching capacity. Excess voltage or loads may result in burning.
- Disconnect the functional ground terminal when performing withstand voltage tests. Not disconnecting the functional ground terminal may result in burning.
- Install the Unit properly as specified in the operation manual. Improper installation of the Unit may result in malfunction.
- Be sure that all the mounting screws, terminal screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.
- Do not allow wire clippings, shavings, or other foreign material to enter any Unit. Otherwise, Unit burning, failure, or malfunction may occur. Cover the Units or take other suitable countermeasures, especially during wiring work.
- Do not allow foreign matter to enter the openings in the Unit. Doing so may result in Unit burning, electric shock, or failure.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. Connection of bare stranded wires may result in burning.
- Wire correctly and double-check all the wiring or the setting switches before turning ON the power supply. Incorrect wiring may result in burning.

- Mount the Unit only after checking the connectors and terminal blocks completely.
- Be sure that the terminal blocks, connectors, Memory Cards, expansion cables, and other items with locking devices are properly locked into place. Improper locking may result in malfunction.
- Check the user program for proper execution before actually running it on the Unit. Not checking the program may result in an unexpected operation.
- Check that the DIP switches and data memory (DM) are properly set before starting operation.
- Set the Detect Low Battery Bit in the PLC Setup to "do not detect" before starting battery-less operation.
- Confirm that no adverse effect will occur in the system before attempting any of the following. Not doing so may result in an unexpected operation.
 - Changing the operating mode of the PLC.
 - Force-setting/force-resetting any bit in memory.
 - Changing the present value of any word or any set value in memory.
- Do not turn OFF the Unit's power supply while transferring or backing up data. CS1G/H-D-CPU□□□H/S Units require a particularly long time to back up. Do not turn OFF the power while the BKUP indicator is lit. The data will not be backed up if power is turned OFF.
- Before turning OFF the power supply, confirm that the Units will start in the appropriate operation modes the next time the power supply is turned ON.
- Resume operation only after transferring to the new CPU Unit and/or Special I/O Units the contents of the DM and HR Areas required for resuming operation. Not doing so may result in an unexpected operation.
- Do not pull on the cables or bend the cables beyond their natural limit. Doing either of these may break the cables.
- Do not place objects on the cables. Doing so may break the cables.
- Use the dedicated connecting cables specified in operation manuals to connect the Units. Using commercially available RS-232C computer cables may cause failures in external devices or the CPU Unit.
- Do not connect pin 6 (+5V) on the RS-232C port on the CPU Unit to any external device other than the NT-AL001 or CJ1W-CIF01 Conversion Adapter. The external device and the CPU Unit may be damaged.
- Do not turn OFF the power supply to the PLC or remove the Memory Card while the Memory Card is being accessed. Before removing a Memory Card, press the button to stop power supply to the Memory Card and wait for the BUSY indicator to go out.
- When replacing parts, be sure to confirm that the rating of a new part is correct. Not doing so may result in malfunction or burning.

- When replacing the battery for a Unit, be sure to follow the procedure described in that Unit's operation manual.
- Before touching the Unit, be sure to first touch a grounded metallic object in order to discharge any static built-up. Not doing so may result in malfunction or damage.
- Do not turn OFF the power supply to the Unit while data is being transferred.
- When transporting or storing the product, cover the PCBs with electrically conductive materials to prevent LSIs and ICs from being damaged by static electricity, and also keep the product within the specified storage temperature range.
- Do not touch the mounted parts or the rear surface of PCBs because PCBs have sharp edges such as electrical leads.
- Double-check the pin numbers when assembling and wiring the connectors.
- Wire correctly according to specified procedures.
- The operation mode upon turning the power ON varies depending on the model. Refer to the user manual for details.
- Do not mount a C200HW-PA/PD□□□□ Power Supply Unit to a CS1D-BC/BI□□□□ Backplane. Otherwise the system will stop.
- Do not mount a CS1D-PA/PD□□□□ Power Supply Unit to any Backplane other than a CS1D-BC/BI□□□□ Backplane. Otherwise faulty operation or burning will occur.
- In a CS1D Duplex-CPU Duplex System, always mount CS1D-CPU□□□□ Duplex-CPU System CPU Units to the CS1D-BC052 CPU Backplane. Faulty operation will occur if any other CPU Unit is mounted.
- In a CS1D Single-CPU Duplex System, always mount a CS1D-CPU□□□□ Single-CPU System CPU Unit to the CS1D-BC82S CPU Backplane. Faulty operation will occur if any other CPU Unit is mounted.
- Do not mount a CS1D-CPU□□□□H/S CPU Unit to a CS1W-BC□□□□ (non-CS1D) CPU Backplane. Otherwise, faulty operation will occur.
- Always confirm that connected external devices are not operating before performing online replacement of Units. Not doing so may result in faulty outputs and unexpected operation in the device or controlled system.
- Follow the procedure in the Operation Manual when performing online replacement of Units.
- When performing online replacement of a Unit, always replace the Unit with one with the same specifications.
- Check that data link tables and parameters are properly set before starting operation. Not doing so may result in unexpected operation. Even if the tables and parameters are properly set, confirm that no adverse effects will occur in the system before running or stopping data links.
- Transfer a routing table to the CPU Unit only after confirming that no adverse effects will be caused by restarting CPU Bus Units, which is automatically done to make the new tables effective.
- Always use the following size wire when connecting I/O Units, Special I/O Units, and CPU Bus Units: AWG22 to AWG18 (0.32 to 0.82 mm²).

■ Reference Manuals

Please be sure to read the related user manuals in order to use the PLC safely and properly. Be sure you are using the most current version of the manual.

Name	Cat No.
CS-series CS1G/H-CPU□□□H, CS1G/H-CPU□□□-EV1 Programmable Controllers Operation Manual	W339
CS-series CS1D-CPU□□□H/S CS1D Duplex System Operation Manual	W405
CS/CJ-series CS1G/H-CPU□□□H, CS1G/H-CPU□□□-EV1, CJ1G-CPU□□□, CJ1G/H-CPU□□□H Programmable Controllers Programming Manual	W394
CS/CJ-series CS1G/H-CPU□□□H, CS1G/H-CPU□□□-EV1, CJ1G-CPU□□□, CJ1G/H-CPU□□□H Programmable Controllers Instructions Reference Manual	W340
CS/CJ-series CS1G/H-CPU□□□H, CS1G/H-CPU□□□-EV1, CJ1G-CPU□□□, CJ1G/H-CPU□□□H Programmable Controllers Communications Commands Reference Manual	W342
CS1W-SCB21/41(-V1), CS1W-SCU21(-V1) Operation Manual	W336
CS1W-ETN21 Ethernet Unit (100Base-TX Type) CS1W-ETN21 Operation Manual Construction of Networks	W420
CS1W-ETN21 Ethernet Unit (100Base-TX Type) CS1W-ETN21 Operation Manual Construction of Applications	W421
CS1W-ETN01/11 Ethernet Unit Operation Manual	W343
CS1D-ETN21D Ethernet Unit Operation Manual	W430
CS1W-FLN22/CJ1W-FLN22 FL-net Unit (100BASE-TX) Operation Manual	W440
CS1W-DRM21(-V1) DeviceNet Unit Operation Manual	W380
DeviceNet Operation Manual	W267
CVM1-DRM21-V1/C200HW-DRM21-V1 DeviceNet Master Units Operation Manual	W379
C200HW-DRT21/QM1-DRT21/DRT1 Series DeviceNet Slaves Operation Manual	W347
C200HW-SRM21/QM1-SRM21/SRT1 Series CompoBus/S Operation Manual	W266
C-series PC Link System Manual	W135
C-series Rack PCs Optical Remote I/O System Manual	W136
C-series Rack PCs Wired Remote I/O System Manual	W120
CS1W-CLK21-V1 (wired) Controller Link Units, CS1W-RPT01/02/03 Repeater Units Operation Manual	W309
CVM1-CLK12/CS1W-CLK12(-V1) (Optical Ring H-PCF Type) CVM1-CLK52/CS1W-CLK52(-V1) (Optical Ring GI Type) Controller Link Units Operation Manual	W370
C200HW-ZW3AT2-E-V2 Controller Link Support Software Operation Manual	W369
CS1W-HIO01/HCP22/HCA22 Customizable Counter Units Operation Manual	W378
CS1W-HIO01/HCP22/HCA22 Customizable Counter Units Programming Manual	W384
CS1W-LC001 Loop Control Unit Operation Manual	W374
CS1W-LC001 Loop Control Unit Function Block Reference Manual	W375
CS1W-LCB01/05 Loop Control Boards, CS1D-CPU□□□ Process-control CPU Units, CJ1G-CPU□□□P Loop-control CPU Units Operation Manual	W406
CS1W-LCB01/05 Loop Control Boards, CS1D-CPU□□□P Process-control CPU Units, CJ1G-CPU□□□P Loop-control CPU Units Function Block Reference Manual	W407
WS02-LCTC1-E CX-Process Tool Operation Manual	W372
WS02-LCTC1-E CX-Process Monitor Operation Manual	W373
WS02-LCMC1-E CX-Process Monitor Plus Operation Manual	W428
CS1W-PTS□□□/PTW01/PDC□□□/PTR□□□/PPS01/PMW□□□/ CJ1W-PTS□□□ Analog I/O Units Operation Manual	W368
CS1W-AD041(-V1)/081(-V1), CS1W-DA041/08V/08C, CS1W-MAD44, CJ1W-AD041-V1/081(-V1), CJ1W-DA021/041/08V, CJ1W-MAD42 Analog I/O Units Operation Manual	W345
C200H-AD003/DA003/DA004/MAD01 Analog I/O Unit Operation Manual	W325
C200H Analog I/O Units Operation Guide	W127
C200H-AD002 Analog Input Unit Operation Manual	W229
C200H-TS001/101 Temperature Sensor Unit Operation Manual	W124
C200H-TC□□□□ Temperature Control Unit Operation Manual	W225
C200H-TV□□□□ Heat/Cool Temperature Control Unit Operation Manual	W240
C200H-PID0□□ PID Control Unit Operation Manual	W241

Name	Cat No.
CS1W-CT021/041 High-speed Counter Units Operation Manual	W902
C200H-CT021 High-speed Counter Units Operation Manual	W311
C200H-CT001-V1/002 High-speed Counter Units Operation Manual	W141
CS1W-NC113/213/413/133/233/433 Position Control Unit Operation Manual	W376
C200H-NC111 Position Control Unit Operation Manual	W137
C200H-NC112 Position Control Unit Operation Manual	W128
C200H-NC211 Position Control Unit Operation Manual	W166
C200HW-NC113/213/413 Position Control Unit Operation Manual	W334
C200H-CP114 Cam Positioner Unit Operation Manual	W224
CS1W-MC421(-V1)/221(-V1) Motion Control Unit Operation Manual	W359
CS1W-MCH71 Motion Control Unit Operation Manual	W419
C200H-MC221 Motion Control Unit Operation Manual: Introduction	W314
C200H-MC221 Motion Control Unit Operation Manual: Details	W315
CV500-ZN3AT-E MC Support Software Operation Manual	W256
CVM1-PRO01 Teaching Box Operation Manual	W320
C200H-ASC02 ASCII Unit Operation Manual	W165
C200H-ASC11/21/31 ASCII Unit Operation Manual	W306
C200H-IDS01-V1/IDS21 ID Sensor Operation Guide	W153
C200H-FZ001 Fuzzy Logic Unit Operation Manual	W208
C200H-OV001 Voice Unit Operation Manual	W172
WS02-CXPC1-EV2 CX-Programmer (Ver. 2.0) User Manual	W361
WS02-CXPC1-EV3 CX-Programmer (Ver. 3.0) Operation Manual	W414
WS02-CXPC1-EV40 CX-Programmer (Ver. 4.0) Operation Manual	W425
WS02-CXPC1-EV50 CX-Programmer (Ver. 5.0) Operation Manual	W437
WS02-CXPC1-EV55 CX-Programmer (Ver. 5.0) Operation Manual—Function Blocks	W438
CX-Server User Manual	W362
CX-Protocol Operation Manual	W344
CX-Simulator Operation Manual	W366
CS/CJ-series CQM1H-PRO01-E/CQM1-PRO01-E/C200H-PRO27-E Programming Consoles Operation Manual	W341
WS02-NCTC1-EV2 CX-Position Operation Manual	W433
CS1W-SPU01/02 Storage & Processing Unit User's Manual	V229
CS1W-SPU01/02 Storage & Processing Unit Operation Manual	V230

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